

CLAIMS

1. A projecting film that is formed on a substrate and has a large number of projecting parts by phase separation, the projecting film characterized by being made of an inorganic material.

2. A projecting film as claimed in claim 1, characterized by comprising a first phase formed on the substrate, and a second phase that is formed on a surface of said first phase and has said projecting parts.

3. A projecting film as claimed in claim 2, characterized in that said first phase contains a component in which at least one first metal compound has been solidified by a gelation reaction, and said second phase contains a component in which at least one second metal compound having a slower gelation reaction rate than said at least one first metal compound has been subjected to a gelation reaction.

4. A projecting film as claimed in claim 1, characterized in that said projecting parts of the projecting film have a diameter larger than a wavelength of visible light.

5. A projecting film as claimed in claim 1, characterized by having an average surface roughness Ra in a range of 10 to 1000nm.

6. A projecting film as claimed in claim 5, characterized by having an average surface roughness Ra in a range of 10 to 300nm.

7. A projecting film as claimed in claim 5 or 6, characterized by having an average surface roughness Ra in a range of 20 to 200nm.

8. A projecting film as claimed in claim 1, characterized by having a maximum surface roughness Rmax of not more than 10 μ m.

9. A projecting film as claimed in claim 8, characterized by having a maximum surface roughness Rmax

of not more than $3\mu\text{m}$.

10. A projecting film as claimed in claim 8 or 9, characterized by having a maximum surface roughness R_{max} of not more than $1.5\mu\text{m}$.

5 11. A projecting film as claimed in claim 1, characterized by having a haze factor not less than 1%.

12. A projecting film as claimed in claim 11, characterized by having a haze factor not less than 2%.

10 13. A projecting film as claimed in claim 11 or 12, characterized by having a haze factor not less than 1.5%.

14. A projecting film as claimed in any one of claims 1 through 6, characterized by having a transmitted color tone value, as represented by $|a^2+b^2|$, the square of the vector sum of Hunter color coordinates (a,b), of not
15 more than 10.

15. A projecting film as claimed in claim 14, characterized by having a transmitted color tone value, as represented by of the vector sum of the Hunter color coordinates (a,b), of not more than 5.

20 16. A projecting film as claimed in any one of claims 1 through 6, characterized in that an angle distribution of scattered transmitted light in response to visible light being perpendicularly incident on the projecting film is within a range of $\pm 20^\circ$ in terms of
25 solid angle.

17. A projecting film as claimed in claim 16, characterized in that a scattering angle distribution of reflected light in response to visible light being perpendicularly incident on the projecting film is within
30 a range of $\pm 40^\circ$ in terms of solid angle from an angle of specular reflection.

18. A projecting film as claimed in any one of claims 1 through 6, characterized by being used as an internal scattering layer disposed in a reflection type
35 liquid crystal display apparatus or a semi-transmission type liquid crystal display apparatus.

19. A projecting film as claimed in claim 1, characterized by being used on a transmitting/diffusing plate.

20. A projecting film as claimed in claim 1,
5 characterized by being used as an anti-glare film.

21. A projecting film as claimed in claim 1, characterized by being formed on a surface of an original-placing window of a copying machine or a side window of an automobile.

10 22. A method of forming a projecting film, characterized by comprising:

a formation step of forming an applied layer by applying, onto the substrate, a sol-form application liquid having mixed therein at least one first metal
15 compound, at least one second metal compound, and at least one solvent; and

a drying step of drying the applied layer to form a large number of projecting parts.

20 23. A method of forming a projecting film as claimed in claim 22, characterized in that the at least one second metal compound has a slower gelation reaction rate than the at least one first metal compound.

24. A method of forming a projecting film as claimed in claim 23, characterized in that the at least one second
25 metal compound has a lower wettability than the at least one first metal compound.

25. A method of forming a projecting film as claimed in claim 22, characterized in that at least one solvent out of the at least one solvent is a single solvent
30 selected from the group consisting of straight-chain glycols having a hydroxyl group at each end thereof represented by the general formula $\text{HO}-(\text{CH}_2)_n-\text{OH}$ wherein $2 \leq n \leq 10$, and polyhydric alcohols represented by the general formula $\text{HO}-(\text{CH}_2)_n(\text{CHOH})_m-\text{OH}$ wherein $n \geq 2$ and $m \geq 1$, or a mixed
35 solvent thereof.

26. A method of forming a projecting film as claimed

in claim 22, characterized in that each of the at least one first metal compound and the at least one second metal compound is a metal compound capable of undergoing a hydrolysis/condensation polymerization reaction.

- 5 27. A method of forming a projecting film as claimed in claim 26, characterized in that each of the at least one first metal compound and the at least one second metal compound is an alkoxide of a metal selected from the group consisting of silicon, aluminum, titanium, zirconium and
10 tantalum.